IN THE CLAIMS:

Please amend claims 2, 5, 8, 15, 18, 20, 25, and 27, as shown in the complete list of claims that is presented below.

Claim 1 (cancelled).

2 . (currently amended) A watermark information embedding apparatus, comprising:

a document image generating section for generating a document image;

a PN code generating section for generating a plurality of PN code sequences;

a watermark image generating section for diffusing units of watermark information using the PN code sequences, generating representational watermark information, and generating a watermark image in which the diffused units of watermark information are redundantly denoted by dot patterns that are repeated at a plurality of locations;

a synthesizing section for overlapping the document image and the watermark image so as to generate a watermarked document image; and

a printer that prints the watermarked document image on a recording medium

wherein the units of watermark information are represented by bits,

wherein the watermark image generating section diffuses each bit of watermark information by representing the respective bit by one of the PN code [[code]] sequences if the respective bit has a first value and by representing the respective bit by a modified version of the one of the PN code sequences if the respective bit has a second value, and

wherein the watermark generating section uses the plurality of PN code sequences so as to diffuse units of watermark information by assigning one of the PN code sequences to <u>all of</u> a row or column and assigning another of the PN code sequences to <u>all of</u> another row or column.

Claim 3 (cancelled).

4. (previously presented) The watermark information embedding apparatus according to Claim 2, wherein the PN code generating section generates an array of two-dimensional PN code sequences in a row direction and a column direction.

5. (currently amended) A watermark information embedding apparatus comprising:

a document image generating section for generating a multipage document image;

a PN code generating section for generating a two dimensional array of PN sequences that together form a three-dimensional PN code group <u>representing</u> a row direction, a column direction, and a page direction respectively;

a watermark image generating section for diffusing units of watermark information using the array of two-dimensional PN code sequences, generating a sequence of representational watermark pages, and generating a multipage watermark image in which the diffused units of watermark information are redundantly denoted by dot patterns that are repeated at a plurality of locations;

a synthesizing section for overlapping the multipage document image and the multipage watermark image so as to generate a watermarked document image; and

a printer that prints the watermarked document image on a recording medium,

wherein the watermark generating section uses the plurality of PN code sequences so as to diffuse units of watermark information by assigning one of the PN code sequences to <u>all of</u> a row or column and assigning another of the PN code sequences to <u>all of</u> another row or column,

wherein the units of watermark information are represented by bits, and

wherein the watermark image generating section diffuses each bit of watermark information by representing the respective bit by at least one of the PN code sequences if the respective bit has a first value and by representing the respective bit by a modified version of the at least one of the PN code seqences <u>sequences</u> if the respective bit has a second value.

6. (previously presented) The watermark information embedding apparatus according to Claim 2, wherein there is at least one dot pattern representing special watermark information.

Claim 7 (cancelled).

8. (currently amended) A watermark information detecting apparatus for extracting units of watermark information, which is diffused by a plurality of PN code sequences and redundantly denoted by dot patterns that are repeated at a plurality of locations in a watermark image, from a document, comprising:

a scanner for scanning the document to produce a scanned image; and

a watermark information detector which detects the diffused watermark information from the scanned image to extract the watermark image from the document, and ~~estimating~~ which estimates an area occupied by the watermark information based on the watermark image and the plurality of PN code sequences,

wherein the units of watermark information are represented by bits,

wherein each bit of watermark information is diffused by representing the respective bit by one of the PN code sequences if the respective bit has a first value and by representing the respective bit by a modified version of the of the PN code sequences if the respective bit has a second value, [[and]]

wherein the watermark information detector calculates correlation values using different PN code sequences, detects a correlation peak value of each PN code sequence, and estimates row addresses and column addresses according to the correlation peak ~~values.~~ values, and

wherein a first one of the PN code sequences is used by the watermark information detector to calculate correlation values for all of a first row or column and a second one of the PN code sequences is used by the watermark information detector to calculate correlation values for all of a second row or column.

9. (previously presented) The watermark information detecting apparatus according to Claim 8, wherein the watermark information detector discriminates whether the watermark information is correctly detected according to at least one correlation peak value of the PN code sequences.

Claim 10 (cancelled).

11. (previously presented) The watermark information detecting apparatus according to Claim 8, wherein the watermark information detector calculates a correlation of a two-dimensional array of PN code sequences, which include different PN code sequences in a row direction and a column direction, so as to estimate the area occupied by the watermark information.

12. (previously presented) The watermark information detecting apparatus according to Claim 8, wherein the document is a multipage document, and wherein the watermark information detector calculates a correlation of a three-dimensional group of PN code sequences, which include different PN code sequences in a row direction, a column direction, and a page direction, so as to estimate the area occupied by the watermark information.

13. (previously presented) The watermark information detecting apparatus according to Claim 8, wherein there is at least one dot pattern representing special watermark information.

Claim 14 (cancelled).

15. (currently amended) A method of embedding watermark information, comprising:

generating a watermark image, the generating step including using a watermark information embedding apparatus to diffuse units of watermark information using a

plurality of PN code sequences, the diffused units of watermark information being redundantly denoted in the watermark image by dot patterns that are repeated at a plurality of locations;

combining the watermark image and a document image so as to generate a combined image; and

outputting the combined image to a printer,

wherein the units of watermark information are represented by bits, and

wherein each bit of watermark information is diffused by representing the respective bit by one of the PN code sequences if the respective bit has a first value and by representing the respective bit by a modified version of the one of the PN code sequences if the respective bit has a second value, and

wherein the plurality of PN code sequences are used so as to diffuse the units of watermark information by assigning one of the PN code sequences to all of a row or column and assigning another of the PN code sequences to all of another row or column.

16. (previously presented) The method of embedding watermark information according to Claim 15, wherein there is at least one dot pattern representing special watermark information.

Claim 17 (cancelled).

18. (currently amended) A method for detecting watermark information using a watermark information detecting apparatus to extract units of watermark information from a document, the units of watermark information being represented by bits and being diffused by using a plurality of PN code sequences in a watermark image, wherein each bit of watermark information is diffused by representing the respective bit by one of the PN code sequences if the respective bit has a first value and by representing the respective bit by a modified version of the one of the PN code sequences if the respective bit has a second value, the method comprising the steps of:

(a) scanning the document with a scanner to produce a scanned image;

(b) extracting the watermark image, step [[(a)]] (b) including detecting the diffused units of watermark information;

(c) calculating correlations between the watermark image and the plurality of PN code sequences; and

(d) estimating an area occupied by the watermark information according to steps (b) and [[(c).]] (c),

wherein step (c) comprises using a first one of the PN code sequences to calculate correlations for all of a first row or column and using a second one of the PN code sequences to calculate correlations for all of a second one of the rows or columns.

19. (previously presented) The method of detecting watermark information according to Claim 18, wherein there is at least one dot pattern representing special watermark information.

20. (currently amended) A method for generating a watermarked document comprising:

generating a watermark image, the generating step including diffusing units of watermark information and redundantly denoting the diffused units of watermark information by dot patterns that are repeated at a plurality of locations;

combining the watermark image and a document image; and

printing the document image onto a recording medium using a printer,

wherein the units of watermark information are represented by bits,

wherein the units of watermark information are diffused using a plurality of PN code sequences, one of the sequences of PN code sequences being assigned to all of a row or column of the watermark information and another of the PN code sequences being assigned to all of another row or column of the watermark information, and

wherein each bit of watermark information is diffused by representing the respective bit by one of the PN code sequences if the respective bit has a first value and by representing the respective bit by a modified version of the one of the PN code sequences if the respective bit has a second value.

Claim 21 (cancelled).

22. (previously presented) The method of Claim 20, wherein said one of the PN code sequences includes a particular PN code and the modified version of said one of the PN code sequences has bits that are inverted from the bits of the particular PN code.

Claim 23 (cancelled).

24. (previously presented) The watermark information embedding apparatus of Claim 2, wherein said one of the PN code sequences includes a particular PN code sequence and the modified version of said one of the PN code sequences has bits that are inverted from the bits of the particular PN code sequence.

25. (currently amended) A watermark information embedding apparatus, comprising:

a document image generating section for generating a document image;

a PN code generating section for generating a plurality of PN code sequences;

a watermark image generating section for diffusing prescribed units of watermark information using the PN code sequences, and generating a watermark image;

a containing watermark document image synthesizer for overlapping the document image and the watermark image so as to generate a watermarked document image, and

a printer to print the watermarked document image onto a recording medium,

wherein the watermark image generating section utilizes the plurality of PN code sequences to represent the watermark information with respect to row units or column units of watermark ~~information.~~ information, with a first one of the PN code sequences being used to diffuse all of a first one of the row or column units of watermark information and a second one of the PN code sequences being used to diffuse all of a second one of the row or column units of watermark information.

~~Claim~~ 26. (previously presented) The watermark information embedding apparatus according to Claim 25, wherein the watermark image generating section assigns one of the PN code sequences to a row or column, and switches to another of the PN code sequences with respect to another row or column.

27. (currently amended) A watermark information detecting apparatus for extracting watermark information from <u>rows and columns of</u> a document, in which the watermark information is diffused by PN code sequences and the diffused watermark information is recorded as a watermark image, comprising:

a scanner for scanning the document to produce a scanned image; and

a watermark information detector which makes an explicit record area of the watermark information by extracting the watermark image from the scanned image and by calculating correlation of the PN code sequences with respect to the watermark image,

wherein the watermark information detector calculates correlation values using different PN code sequences, detects a correlation peak value of each PN code sequence, and estimates row addresses or column addresses according to the correlation ~~peaks.~~ <u>peaks, and</u>

<u>wherein a first one of the PN code sequences is used by the watermark information detector to calculate correlation values for all of a first one of the rows or columns and a second one of the PN code sequences is used by the watermark information detector to calculate correlation values for all of a second one of the rows and columns.</u>